Properties Group III Nitrides

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There are several families of semiconductors, the most familiar probably being the elemental semiconductors Si and Ge, located in column IVB of the periodic table. The III-V compounds and alloys are formed from various combinations of atoms located in columns IIIB and VB. Interest in the III-Nitrides materials, which include the direct band gap semiconductors InN, GaN, and AlN centres on the combination of the wide energy gap and high electron mobility obtainable in InN, the blue electroluminescence characteristic of GaN and the insulating and piezoelectric properties of AlN and GaN. By contrast films of BN, which is an indirect bandgap semiconductor, have been of interest primarily for wear- and corrosion-resistant, electrically insulating and passivating surfaces.

This is volume 11 of the Electronic Materials Information Service (EMIS) series and as with the others it organises the most current available data and provides a useful reference to the III-Nitrides research community. Chapter 1 review the basic physical properties of the group III nitrides. Chapters 2 and 3 cover phase diagrams and electrical transport properties. Chapters 4 and 5 contain the band structure of pure group III nitrides and alloys. The important fundamental optical functions are discussed in Chapter 6. Photoluminescence, cathodoluminescence, Raman and IR reflection chracteristics of III-Nitrides are reviewed in Chapters 7 and 8. Chapter 9 provides a discussion of defects and impurities in III-Nitrides. Finally, Chapter 10 reviews the properties of interfaces, both metallic and semiconducting heterojunctions, formed with group III-Nitrides.

This book aims to provide a useful reference for researchers in this field, as well as a starting point and guide for those who are seeking to further exploit the unique properties of the III-Nitrides based compounds and their alloys. Finally, I would like to congratulate the editor and the authors for their considerable efforts and I hope that this volume will serve as a complete reference for the III-Nitrides technology, and stimulate further work in this exciting and expanding field.

M Henini

Properties of Narrow Gap Cadmium-Based compounds

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Narrow bandgap semiconductors have many unique properties arising from their band structure. One of the primary sources of interest is the small bandgap, which make them the material of choice for many applications in the infrared. The biggest single application of the narrow bandgap materials has been infrared sources and detectors. The use of these systems as detectors for the military is well-known, and were amply demonstrated in the Gulf War where infrared imaging sensors for missile and surveillance systems have been vital to military operations. The narrow gap II-VI compounds, which are formed from the heavier elements (Cd, Hg and Te), have found major applications as infrared detectors. CdHgTe (CMT) detectors were first used in prototype imaging systems in 1965. Since then the technology has advanced rapidly, and more resources have been invested in the development of CMT than in any other semiconductor systems except silicon and GaAs. Developments in the technology of CMT were mainly pioneered in industrial and defence laboratories, and were cloaked in secrecy. As a result, basic science research on the CMT material did not start until relatively later. When the layers become available, the material attracted a tremendous interest amongst fundamental researchers because of its unique properties. CdTe, CdZnTe and CdSeTe are technologically important members of the family II-VI compounds semiconductors. Their most important application is as substrate for the epitaxial growth of CMT. In addition to covering the MCT system (part A: 360 pages) this volume contains a large section (part B: 238 pages) on the CdTe, CdZnTe, CdSeTe range of materials.

The data on the properties of the narrow gap Cadmium-based compounds are scattered over many decades in time and many journals. One must spend an inordinate amount of time and effort to gather the information needed. This Electronic Materials Information Service (EMIS) Datareviews Series No. 10 book from INSPEC, with contributions from experts in the field, will certainly be one of the most referenced books in research institutions.

Parts A and B of this book, devoted entirely to MCT system and CdTe/CdZnTe/CdTeSe materials respectively, deals in detail with the growth; the mechanical, thermal, dielectrical, optical, band structure and carrier properties; diffusion and defects; surfaces and interfaces; and exploitation in devices.

The book will fulfil its purpose if it gives the reader easier access and better evaluation of future trends. The main attraction of this type of book is that it provides an excellent starting point for workers entering the field and a useful reference to the Cd-based compounds research community. This volume of EMIS Datareviews Series, which is well produced, can be recommended on both counts since it provides a widely based cross-section of topics in this area and organises the most current available data. This volume adds to the excellent and already extensive range of previous EMIS Datareviews Series published by INPEC on various subjects.

M Henini